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## **Establishment of Agglomerations as the Basis for Solving the Problems of Modern Cities Development in Russia (by the Example of the Krasnoyarsk Agglomeration)**

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*The article considers the need of agglomerative development for the purpose of solving the key problems of the Russian cities: traffic congestion, development of the real sector of economy (industry) and territorial planning. We analyze the basis of each of the above named problems and prove that it is impossible to find the solutions of the presented problems inside a particular megalopolis.*

*Keywords. Agglomeration, agglomerative development, territorial problems of the cities, territorial planning, real sector of economy, industry, traffic congestion.*

### **Introduction**

In market economy, large metropolitan areas and cities have become major sources of development. Administrative, financial and human resources are concentrated here (these days about 1.7 billion people live in agglomerations with population exceeding 1 million people – 24.2 % of the planet population), which creates a prerequisite for the post-industrial shift.

Other territories, such as satellite cities and rural areas, have turned into auxiliary elements of city development. However, any process of urbanization has its limits: intensive development of the urban area starts to fail at a certain stage and ceases to create positive economic and social effects. The economic aspect arises in this case:

formerly industry concentration gave an additional effect (“agglomeration effect”) due to the broad possibilities of combination, co-operation, and the use of over-concentration, while later negative aspects moved to the forefront:

- traffic congestion in cities,
- water supply difficulties,
- environmental problems.

Thereupon, the industry is compelled to “leave” big cities, while science, research and development, financial management and other areas substitute it. Therefore, it changes the requirements for the infrastructure and planning of the city: the need to develop the infrastructure in suburban areas and to increase the capacity of highways in central parts arises, because of the

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increasing housing density, higher number of the storeys built.

In 2010 there were 22 agglomerations with the population exceeding one million totaling to 48.7 million people (34% of the total population of Russia).

The process of the Krasnoyarsk agglomeration formation was initiated in September 2007 by Alexander G. Khloponin, Krasnoyarsk Territory ex-governor. The main purpose of the Krasnoyarsk agglomeration was defined in A.G. Khloponin's report for the Ministry of Regional Development of the Russian Federation in 2007: "Elimination of the difference between the pace of development of European part of Russia and the Krasnoyarsk Territory, formation of a powerful urban center in Siberia capable to attract experienced workforce and become a comfortable place to live".

### **Solution to the issues of territorial planning**

Unlike a particular big city, the agglomeration has a more rational territorial distribution of important objects. Due to significant territorial resources, urban renewal is possible, and it is one of the most important factors of modern cities' development.

Because of the difference in the land price in the center and the periphery, various productions, occupations and a part of the population is gradually moving from the center to the periphery.

Suburbanization of the population and industry gives an impulse for the periphery development, recovers its economy. As a result, the center is able to update and maintain its function of storage and generation of innovation.

Meanwhile, the chaotic development of the agglomeration generates a number of systemic problems connected with the efficient territory use.

The territory that is situated in a close proximity to Krasnoyarsk city as well as the woodland zone around the city is constantly under continuous designed construction process that can be forecasted, which identifies the development of the center of the Krasnoyarsk Agglomeration by the "oil stain" principle. Lack of a unified and approved strategy of territorial development leads to filling of the most significant territories with poor architecture with limited green zones, irrational consolidation of city density and as a result lower comfort of living.

In addition, territorial development is restrained by extremely irregular supply of the main types of engineering infrastructures. In general, the area has a sufficient infrastructure potential for the production development.

However, it should be taken into account, that Krasnoyarsk and areas under its influence represent a monocentric agglomeration; therefore the territory is supplied with core infrastructures irregularly.

That is why in terms of production placement the most attractive areas are in the core of the agglomeration or in immediate proximity of it. Consequently, this results in the fact that environmentally harmful productions can be placed here due to economic efficiency.

Observance of interests of all managing subjects during territorial planning becomes complicated with the existence of an interdisciplinary (inter-branch) component.

Territorial plans should be based on an integrated strategy that takes into account the development of the economy and the social sphere. At the present moment the strategy project of development of the Krasnoyarsk agglomeration needs additional study, update and approval.

Up to the present moment the Krasnoyarsk Territory government has not had any "specific" policy in respect of the agglomeration. The processes of self-organization were prevailing.

Only long-term, multi-faceted, coordinated work of authorities at the federal, regional and municipal levels that is able to develop and adjust to the ongoing process of the region and country development, will be effective and allow Krasnoyarsk become a competitive city attractive for living, as well as an investment center of inter-regional and international level.

### **Development of the real sector of economy (industry)**

It is known that the main part of industrial production in Russia is concentrated at large enterprises having considerable capacities and, as a result, occupying extensive land lots. Especially large areas are occupied by the enterprises of the machinery construction sector of the national economy. It is characterized by the large-sized equipment, extensive production infrastructure, inability to use multi-storied building due to technological features of production.

Special features and peculiarities of factories and enterprises placement are rooted in the Soviet Union period. Very often industrial facilities were situated at the territory of big cities, often even in the central part of a city zone or near inhabited quarters. This arrangement was defined by transport availability to labour forces (during the Soviet Union period the level of development of individual transport was extremely low and people's mobility was carried out with use of public transport or on foot), proximity of infrastructure and rather high

quantity of free ground resources within the city zone (the share of urban population in those days was considerably lower than these days).

In subsequent periods, the main tendency of territories' development in big cities was their expansion along with acquisition (mergence) of suburbs as a result of the urbanization process development; therefore, the industrial enterprises which have been settling down earlier on the suburb, appeared within the city area or even in the business center. Nowadays it causes a number of problems, such as: inefficient use of urban areas, violation of town-planning regulations and deterioration of the city environmental situation.

The data presented above testifies that the machine constructing enterprises, as well as other industrial enterprises are large land users. Industrial facilities occupy about 18 % of the total area of Krasnoyarsk city. Growth of urban population caused prompt development of construction of residential buildings, as well as commercial and business centers. As a result the large quantity of the enterprises appeared in residential or commercial zones of big Russian cities. In this regard another problem occurred – high cost of ground resources on territories of megalopolises and, as a result, high payments for the placement space. As a result, the economy today is constrained to take certain losses: the underestimated cadastral assessment of land lots is set up for industrial land users, in comparison with alternative using options. It turned up into losses of the budgetary system at the municipal

Table 1. The occupied area of the Krasnoyarsk city by largest engineering plants

Name	Area (square km)	Percentage (%)
OJSC Krasnoyarsk Harvester Plant	658,057	0.17
OJSC Krasnoyarsk Electric Train Repair Plant – branch of OJSC Russian Railways	336,157.29	0.08
CJSC Siberian Heavy Machinery Construction Plant	1,228,214.7	0.32

level. Thereby, everyone is at a disadvantage from placement of industrial facilities at the territory of big cities and megalopolises: the enterprises incur high costs for payments in the budget, the population suffers additional environmental pressures and authorities lose additional payments in the budget.

In the presented analysis, it would seem that a solution to a current situation is obvious: a withdrawal of industry capacities from cities and megalopolises to the free land plots. Also it is obvious that property in the central part of the city is more expensive than similar property beyond its limits, and necessity of construction of new manufactories is required not only because of the removal, but also because of the high level of deterioration.

In Table 2 below we present the calculation of possible cost of land plots under the chosen large objects of industrial land use. The calculation is made on the basis of research of the year 2006 (for the today's period of time real estate cost in Krasnoyarsk is at the price level of 2007-2008 that defines an urgency of the presented values).

The calculations presented in the table above define a significant value of the land resources occupied by industrial objects, and prove economic feasibility of their complete or partial removal from the city. But it does not occur in practice due to several reasons:

- Imbalances of the infrastructure development: suburbs of big Russian cities, as a rule, have a low level of

infrastructure development: they are in need of investments into transport, power and other infrastructure construction. Therefore, removal of industrial facilities can be economically effective only in case of a comprehensive approach: preparation of sites for removal of several industrial enterprises at once will allow to save essentially at the expense of scales;

- Administrative barriers: any industrial or other construction assumes the long and expensive period of coordination, approval, construction and commissioning. In this regard it is necessary to solve these issues in a multilateral order: entrepreneurs, authorities of local government of the cities and areas, authorities of the subject of federation, federal services and departments;
- Insufficiency of budgetary funds: municipal areas, as well as the majority of big cities of Russia, have no sufficient funds for engineering preparation of territories for removal of industrial facilities; for the solution of the matter it is necessary to launch regional or federal target programmes at the expense of the funds of the higher level of the budgetary system of the Russian Federation.

### **Solution of transport issues**

The design framework of Russian cities was established in the Soviet period and was

Table 2. Cost of land occupied by the largest engineering plants of Krasnoyarsk city.

Name	Land value if used in a best alternative option, thousand rubles
OJSC Krasnoyarsk Harvester Plant	3 478 489
OJSC Krasnoyarsk Electric Train Repair Plant – branch of OJSC Russian Railways	2 208 217
CJSC Siberian Heavy Machinery Construction Plant	5 217 456

not planned to correspond to the contemporary conditions of the market economy. Transition of Russia into a post-industrial way of development changed approaches to city planning: the increase of the share of the non-material sector of production caused growth of cost of land resources in big cities and megalopolises that in turn led to the increase in number of storeys (density) of building construction, including the development of pointed building in the central and business parts of the cities. In fact, it only intensified the process of concentration of the population and economic activities at the territory of the cities of our country. Hence, the development of the transport infrastructure was always limited to space possibilities. As a result, one of the key problems of our country megalopolises is the overload of street traffic. This problem is also urgent for Krasnoyarsk city.

According to the Ministry of Transport calculations, economic losses from traffic jams account for 7-9 % of GDP per year (about 4.1-5.3 trillion rubles). It consists of the cost of low reliability and velocity of transportations, high prime costs, frequent road accidents, growth of emissions of polluting substances. The Ministry suggests to reorganize the regulations of the traffic, in particular, to launch some restrictions in order to solve the problem partially. According to the Ministry of Transport nearly a third of federal highways work nowadays in an overload mode, while multilane roads make 8 % from the total amount.

The Krasnoyarsk agglomeration is characterized today by an extremely high value of passenger traffic: 288.8 million pass/km for the year 2010. At the same time the significant part of this flow was transported by personal auto transport – the daily number of auto transport users makes more than 800 thousand people. The distinctive feature of auto transport is a need for a greater number of vehicles for transporting

the same number of passengers. This is one of the key problems issues of the Krasnoyarsk agglomeration: lack of high-speed public transport.

High growth rates of passenger traffic – 138.4 % in the year 2010 in comparison to the year 2009 also should be noted. It can be accounted for improvement of the economic situation and, first of all, quantity growth of personal auto transport. Thus, if in 1984 in Krasnoyarsk there were 40 cars for individual use of 1,000 inhabitants, in 2004 – 178 cars, now this level reaches 384 cars. As a result, economic losses of the population and entrepreneurs only increase from shortage of the capacity of available transport highways.

The other reasons contributing to the high density of traffic in the city of Krasnoyarsk are:

- Intensive commuting in the morning rush hours in the direction the southern river bank – the northern river bank, and in the opposite direction in the evening;
- Lack of transport connections from the city to the suburbs;
- Absence of non-stop driving streets;
- No off-street public transport (due to the fact that railway has only one round route and there is no connection to other means of public transport, railway is separate and can hardly claim to be public transport)
- Transport accessibility of the city districts is complicated by the river and two railway lines;
- Shortage of the highway network;
- No vehicle storage system;
- Imperfect system of traffic management.

The above problems are not a distinctive feature of the Krasnoyarsk agglomeration; they are typical for all big Russian cities. In turn, the suspense of transport problems is the core factor of environmental degradation. It leads to deterioration of health, increases costs of health care and reduces an indicator of the quality of life.

Table 3. Transport infrastructure projects.

Project name	District	Investment, million rubles
Development of Krasnoyarsk international air hub (multimodal transport system based on the airport "Krasnoyarsk")	Emel'yanovskij District	53,375
Construction of the Krasnoyarsk ring road, 2 phase, including construction 4th road bridge over the river Yenisei	Emel'yanovskij District, Berezovskij District, Krasnoyarsk City	18,000
Purchase of the buses for public transportation companies in Krasnoyarsk	Krasnoyarsk City	320.3
Special economic zone in Emel'yanovskij District	Emel'yanovskij District	24,903.55
Construction of the city road 11, 12th residential district of a low housing estate, Molodezhnaya St., in the extent of 1,2 km	Krasnoyarsk City	119.5
Construction of city road Yunosti St., Vesennaya St., extent of 2,0 km	Krasnoyarsk City	136
Logistics center of the food market of Krasnoyarsk Territory	Emel'yanovskij District	2,218.32

Currently, in order to solve traffic problems there are seven major projects in the transport infrastructure development. A significant part of these projects involves utilization of neighboring municipalities, as any other solution to this problem within the city center is no longer possible.

Thus, about 70% of investment in the transport infrastructure (excluding Krasnoyarsk ring road) in accordance with the policy documents will be forwarded to solve problems outside of the city of Krasnoyarsk.

### Conclusion

The Krasnoyarsk agglomeration is considered to be a complex area with priority development of major industries. Thus, resources of municipalities and their development are not equivalent; especially it concerns the big city and boundary territories. Obviously, Krasnoyarsk performs its functions with other municipalities that are included in the metropolitan area.

An urgent need for agglomerative development of Krasnoyarsk city and adjacent

territories is defined by a number of factors: development of the real sector of economy on the basis of entirely or partially transferring of existing production plants outside the city; new solutions to transport problems of business entities and people inhabiting the area by means of utilization of the border territory to construct solid and substantial highway networks; solving territorial planning issues: utilization of adjacent territories with a purpose of disposition of economic and social facilities.

The concept of "agglomeration" is not formally defined in the Russian legislation and this is one of the main factors that hinders its establishment. As a result, there is no controlling mechanism for management of city agglomerations.

In this regard, optimization of the area development management is only possible on the basis of an interconnected system of strategic planning documents of the regional and municipal levels.

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## **Формирование агломераций как основа решения территориальных проблем развития современных городов России (на примере Красноярской агломерации)**

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*Рассмотрена необходимость агломеративного развития с целью решения ключевых проблем российских городов: транспортная перегруженность, развитие реального сектора экономики (промышленности), территориального планирования. Авторы статьи анализируют основы каждой из названных проблем и обосновывают идею о том, что решение представленных проблем сегодня невозможно внутри отдельно взятого мегаполиса.*

*Ключевые слова: агломерация, агломеративное развитие, территориальные проблемы городов, территориальное планирование, реальный сектор экономики, промышленность, транспортная перегруженность.*

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